

What is claimed is:

1. A laser-light source comprising:

a heat-dissipation block made of copper or copper alloy;

5 a plurality of submounts which are made of a material having a thermal expansion coefficient of 3.5 to $6.0 \times 10^{-6}/^{\circ}\text{C}$, have a thickness of 200 to 400 micrometers, and are separately formed on said heat-dissipation block;

10 a plurality of semiconductor lasers each of which is made of a nitride compound, has a single cavity and a form of a chip, and is mounted junction-side-down on one of said plurality of submounts;

a multimode optical fiber; and

15 an optical condenser system which collects laser beams emitted from said plurality of semiconductor lasers, and couples the collected laser beams to said multimode optical fiber;

20 wherein each of said plurality of semiconductor lasers and said plurality of submounts has a bonding surface, and the bonding surface of each of the plurality of semiconductor lasers is bonded to the bonding surface of one of the plurality of submounts through a metalization layer and an Au-Sn eutectic solder layer each of which is divided into a plurality of areas.

25 2. A laser-light source according to claim 1, wherein each of said plurality of semiconductor lasers contains a

light emission region, and said metalization layer and said Au-Sn eutectic solder layer are separated by a groove which is arranged immediately below the light emission region.

3. A laser-light source according to claim 1, wherein
5 said plurality of submounts are made of AlN.

4. A laser-light source according to claim 1, wherein said plurality of submounts are bonded to the heat-dissipation block with Au-Sn eutectic solder.

5. A laser-light source according to claim 1, wherein
10 said plurality of semiconductor lasers respectively contain active layers and light emission points, the light emission points of the plurality of semiconductor lasers are arranged on a line parallel to the active layers, said optical condenser system includes a plurality of collimator
15 lenses and a condenser lens, said plurality of collimator lenses are arranged in correspondence with the plurality of semiconductor lasers and respectively collimate said laser beams emitted from the plurality of semiconductor lasers, said condenser lens collects the laser beams
20 collimated by the plurality of collimator lenses, and makes the collimated laser beams converge on an end face of said multimode optical fiber, and said plurality of collimator lenses each have an aperture which has a first diameter parallel to said line and a second diameter perpendicular
25 to said line and greater than the first diameter.

6. A laser-light source according to claim 5, wherein

said plurality of collimator lenses are integrally formed into a lens array.

7. A laser-light source according to claim 1, wherein said heat-dissipation block is constituted by a plurality
5 of blocks which are joined.

8. A laser-light source according to claim 1, wherein each of said plurality of semiconductor lasers is a GaN-based compound semiconductor laser.

9. A laser-light source according to claim 1, wherein
10 said multimode optical fiber has a core diameter not greater than 50 micrometers and a numerical aperture not greater than 0.3.

10. A laser-light source according to claim 1, wherein said multimode optical fiber has a core diameter and a numerical aperture, and the core diameter multiplied
15 by the numerical aperture is not greater than 10 micrometers.

11. A laser-light source according to claim 1, wherein said plurality of semiconductor lasers are arranged on a line, and the number of the plurality of semiconductor
20 lasers is three to ten.

12. A laser-light source according to claim 11, wherein said plurality of semiconductor lasers are arranged on a line, and the number of the plurality of semiconductor lasers is six or seven.

25 13. A laser-light source according to claim 1, wherein each of said plurality of semiconductor lasers has

an emission width of 1.5 to 5 micrometers.

14. A laser-light source according to claim 13, wherein each of said plurality of semiconductor lasers has an emission width of 2 to 3 micrometers.

5 15. A laser-light source according to claim 1, wherein said plurality of semiconductor lasers are fixed so that the plurality of semiconductor lasers are two-dimensionally arranged when viewed from a laser-receiving side.

10 16. A laser-light source comprising a plurality of laser-light-source portions each of which includes:

a heat-dissipation block made of copper or copper alloy;

15 a plurality of submounts which are made of a material having a thermal expansion coefficient of 3.5 to $6.0 \times 10^{-6}/^{\circ}\text{C}$, have a thickness of 200 to 400 micrometers, and are separately formed on said heat-dissipation block;

20 a plurality of semiconductor lasers each of which is made of a nitride compound, has a single cavity and a form of a chip, and is mounted junction-side-down on one of said plurality of submounts;

a multimode optical fiber; and

25 an optical condenser system which collects laser beams emitted from said plurality of semiconductor lasers, and couples the collected laser beams to said multimode optical fiber;

wherein each of said plurality of semiconductor lasers and said plurality of submounts has a bonding surface, the bonding surface of each of the plurality of semiconductor lasers is bonded to the bonding surface of one of the plurality of submounts through a metalization layer and an Au-Sn eutectic solder layer each of which is divided into a plurality of areas, and said multimode optical fiber in the plurality of laser-light-source portions is arranged to constitute a one-dimensional array at least at a light-emission end of the multimode optical fiber.

17. A laser-light source comprising a plurality of laser-light-source portions each of which includes:

a heat-dissipation block made of copper or copper alloy;

a plurality of submounts which are made of a material having a thermal expansion coefficient of 3.5 to $6.0 \times 10^{-6}/^{\circ}\text{C}$, have a thickness of 200 to 400 micrometers, and are separately formed on said heat-dissipation block;

a plurality of semiconductor lasers each of which is made of a nitride compound, has a single cavity and a form of a chip, and is mounted junction-side-down on one of said plurality of submounts;

a multimode optical fiber; and

an optical condenser system which collects laser beams emitted from said plurality of semiconductor

lasers, and couples the collected laser beams to said multimode optical fiber;

wherein each of said plurality of semiconductor lasers and said plurality of submounts has a bonding surface, the bonding surface of each of the plurality of semiconductor lasers is bonded to the bonding surface of one of the plurality of submounts through a metalization layer and an Au-Sn eutectic solder layer each of which is divided into a plurality of areas, and said multimode optical fiber in the plurality of laser-light-source portions is arranged to constitute a bundle at least at a light-emission end of the multimode optical fiber.

18. An exposure system comprising a plurality of laser-light sources each of which is provided for exposure and includes:

a heat-dissipation block made of copper or copper alloy;

a plurality of submounts which are made of a material having a thermal expansion coefficient of 3.5 to $6.0 \times 10^{-6}/^{\circ}\text{C}$, have a thickness of 200 to 400 micrometers, and are separately formed on said heat-dissipation block;

a plurality of semiconductor lasers each of which is made of a nitride compound, has a single cavity and a form of a chip, and is mounted junction-side-down on one of said plurality of submounts;

a multimode optical fiber; and

an optical condenser system which collects laser beams emitted from said plurality of semiconductor lasers, and couples the collected laser beams to said multimode optical fiber;

5 wherein each of said plurality of semiconductor lasers and said plurality of submounts has a bonding surface, the bonding surface of each of the plurality of semiconductor lasers is bonded to the bonding surface of one of the plurality of submounts through a metalization layer and an Au-Sn eutectic solder layer each of which is
10 divided into a plurality of areas, and said multimode optical fiber in the plurality of laser-light sources is arranged to constitute a one-dimensional array at least at a light-emission end of the multimode optical fiber.

15 19. An exposure system comprising a plurality of laser-light sources each of which is provided for exposure and includes:

 a heat-dissipation block made of copper or copper alloy;

20 a plurality of submounts which are made of a material having a thermal expansion coefficient of 3.5 to $6.0 \times 10^{-6}/^{\circ}\text{C}$, have a thickness of 200 to 400 micrometers, and are separately formed on said heat-dissipation block;

 a plurality of semiconductor lasers each of
25 which is made of a nitride compound, has a single cavity and a form of a chip, and is mounted junction-side-down on

one of said plurality of submounts;

a multimode optical fiber; and

an optical condenser system which collects laser beams emitted from said plurality of semiconductor lasers, and couples the collected laser beams to said multimode optical fiber;

wherein each of said plurality of semiconductor lasers and said plurality of submounts has a bonding surface, the bonding surface of each of the plurality of semiconductor lasers is bonded to the bonding surface of one of the plurality of submounts through a metalization layer and an Au-Sn eutectic solder layer each of which is divided into a plurality of areas, and said multimode optical fiber in the plurality of laser-light sources is arranged to constitute a bundle at least at a light-emission end of the multimode optical fiber.